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Prevention and Safety Against Fire in Ropeways — Code of Practice

ICS 93.110

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Continuous Bulk Conveying, Elevating, Hoisting, Aerial Ropeways and Related Equipment Sectional Committee, MED 06

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Continuous Bulk Conveying, Elevating, Hoisting, Aerial Ropeways and Related Equipment Sectional Committee, had been approved by the Mechanical Engineering Divisional Council.

An aerial ropeway is a special form of transportation system where passengers/materials are carried on a tensioned wire rope supported above the ground. In ropeways handling passengers, safety, reliability, and conformance to high-quality and good industry practices are paramount for securing the safety of the users. Aerial ropeways are particularly useful in regions where the facility in surmounting natural barriers gives them a great advantage over railways or roads, both of which may need the heavy civil engineering work to secure easy gradient. They are inexpensive to maintain, pollution free, environment friendly, does not affect aesthetics, their power demand is modest; and, they are not seriously affected by adverse climatic conditions.

Nothing in this standard is intended to contravene any provisions of the statutory regulations wherever they are in force.

Composition of the Panel-1 on 'Aerial Ropeways' of MED 06 responsible for the formulation of this standard is given at Annex A.

The Standard recognizes that safety of life is more than a matter of means of egress and accordingly deals with various matters which are considered essential to the safety of life. The standard therefore covers provisions relating to means of egress covering various components thereof namely, exit access, exit and exit discharge.

It also covers provisions relating to fire protection of buildings through portable and fixed firefighting installations. Fire protection techniques have to be based on the fire behaviour characteristics of different materials and structural elements of buildings. The activities pursued by the occupants of buildings must also be taken into consideration for assessing the extent of hazards, and method should then be devised by which the hazards could be minimised.

An indefinite combination of variables is involved in the phenomenon of fire, all of which cannot be quantified. The requirements of this standard should, therefore, be taken as a guide.

Absolute safety from fire is not attainable in practice. The objective of this part is to specify measures that will provide that degree of safety from fire which can be reasonably achieved.

The standard endeavours to avoid requirements that might involve unreasonable hardships or unnecessary inconvenience or interference with normal use and occupancy of buildings, but insists upon compliance with minimum standards of fire safety necessary for building occupants and users. For ensuring compliance of fire protection equipment/installations to the laid down quality requirements, it is desirable to use such equipment/ installation duly certified under the BIS Certification Marks Scheme.

While providing guidelines for minimizing chances of occurrence of fire through passive fire protection measures, this Part does not intend to cover all aspects of general fire prevention including sources of ignition. Nor does it cover the prevention of accidental personal injuries during the course of normal occupancy of buildings.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*) . The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PREVENTION AND SAFETY AGAINST FIRE IN ROPEWAYS — CODE OF PRACTICE

1 SCOPE

This standard deals with safety from fire and covers the requirements for fire prevention, life safety in relation to fire and fire protection of ropeway installations. This standard specifies definitions, different hazards and over all fire prevention.

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in the text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

For the purpose of this standard, all terminology given in IS 7649 and the following shall be applicable.

3.1 Inspecting Authority — Any competent authority recognized by the statutory regulations to inspect the aerial ropeways installation and, determine its acceptability or otherwise, on the basis of this standard and compliance to prevailing statutory rules and regulations. If required, competent authority may hire external agencies like engineering institutions/independent experts for carrying out said inspection.

4 GENERAL APPLICABILITY

The provisions of this Part are applicable to,

a) Drive unit area;
b) Carrier;
c) Lifts, if any; and
d) Electrical control area.

5 DEFINITIONS

For the purpose of this standard, the following definitions shall apply.

5.1 Assisted Evacuation

Strategy that exists during which a designated person or persons provide assistance, during an emergency, to another person(s) to leave a building or a specific part of the built environment and to reach a final place of safety.

5.2 Authorities Concerned

An organization, office, or individual responsible for enforcing the requirements of a standard or,for approving or accepting equipment, materials, an installation, or a procedure.

5.3 Automatic Fire Detection and Alarm System

A system comprising components and sub-systems required for automatically detecting smoke, heat or fire initiating an alarm and other actions as appropriate.

5.4 Combustible Material

A material which either burns itself or adds heat to a fire.

5.5 Emergency Lighting

Lighting provided for use when the supply to the normal lighting fails.

5.6 Reaction to Fire

It is the behaviour of a material that as a result of its own decomposition, feeds a fire to which it is exposed under specified conditions.

5.7 Lift Lobby

A space from which people directly enter a lift car(s) and into which people directly enter upon exiting a lift car(s).

5.8 Station

A place designated for the purpose of loading/boarding/de-boarding and unloading, including service area and ancillary spaces associated with the same structure.

6 HAZARDOUS SITUATION

6.1 It arises when fire is located at:

a) Station;
b) Machinery area particularly at drive unit;
c) Electrical control area;
d) Carrier; and
e) Weird behaviour of passenger.

6.2 In the event of any outbreak of fire, the following hazards may occur:

a) Breathing difficulties from smoke and fumes;
b) Burns;

c) Injury while escaping fire; and
d) Building debris which may impact injuries.

7 CAUSES OF FIRE

Most common causes of fire outbreaks are:

a) Combustible dust;
b) Work involving high temperatures(hot work) like welding, gas cutting etc.;
c) Faulty equipment and machinery;
d) Easily inflammable liquids and gases;
e) Improperly supervised electrical circuitscreating an ignition source for combustible dust and flammable liquids; and
f) Electrical fire hazards from wiring done not in conformity to Indian Standards, overloaded outlets, extension cords, overloaded circuits and static discharge which can cause a spark.

8 PREVENTION OF FIRE

8.1 General

a) Avoid hot work inside station, if possible;
b) Provide periodic awareness and training program so that all workers understand the hazards associated with hot work, any site-specific hazards and the use of safety equipment;
c) Ensure that the area is clear of flammable or combustible materials including dusts, liquids, and gasses;
d) Make sure a safety professional is on hand to provide supervision;
e) Equipment and machinery should be properly rated as per installation specific design;
f) Equipment and machinery especially electrical equipment, which is covered with dirt or grease, should always be kept clean;
g) Follow manufacturer's recommended maintenance procedures for maintenance all of the equipment and machinery; and
h) Implement a reporting system in the event of fire detection.

8.2 Ropeway Station

a) Area requirement to be designed as per the volume of the traffic;
b) Separate exit;
c) Availability of Fire extinguishers. The number of extinguishers and their extinguishing capacity must correspond to the National and all local regulations in force;
d) Trained personnel for operation of extinguisher;
e) Adherence to local area regulation/ National Building Code(NBC) Vol I;
f) Spread of fire to the adjacent building is limited;
g) Rescue of the stranded persons, if required;
h) Prohibition of smoking; and
j) Prohibition of transportation and storage of inflammable materials.

8.3 Drive Unit Area

a) Prohibition of smoking;
b) Prohibition of transportation of inflammable materials;
c) For hydraulic circuits, metallic piping should be used;
d) Hydraulic oil recommended by the manufacturer shall be used;
e) Appropriate earthing system;
f) Proper laying of power cables in dedicated cable tray;
g) Availability of smoke detection system, wherever possible;
h) Availability of Fire extinguisher;
j) Availability of proper trained personnel for using Fire extinguisher; and
k) Electrical equipment fire protection as per IP-54.

8.4 Carrier

a) Prohibition of smoking;
b) Prohibition of transportation of inflammable materials;
c) Use of fire resistant material for chair and wall coverings with non-flammable materials. Fabrics and papers used for such purpose shall be treated with an effective flame-retardant material; and
d) Lift.

Generally in ropeway installations lift is provided in the open areas. Body of the lift shall be made of fire resistant materials.

8.5 Electrical Control Area

a) Use and maintain wiring, tools and equipment correctly. Keep everything oil and dust free;
b) Avoid temporary equipment plugged in when it's not in use;
c) Avoid using extension cords;
d) In the event of any fire or smoke, electrical power supply should immediately be shut off;
e) Availability of smoke detection and alarm system wherever possible;
f) Electrical conductors and components be used with electrical overload protection;
g) Metallic electric cabinets shall be used;

h) Outer sheath of electrical cables shall be made from non-flammable material; and
j) Appropriate earthing system.

8.6 Supply — Diesel Generator Set

a) Diesel generator set(s) shall not be installed at any floor other than ground/first basement. If the same are installed indoors, proper ventilation and exhaust shall be planned. The DG set room shall be separated by 120 min fire resistance rated walls and doors;
b) Diesel generator set in sound proof enclosure shall preferably be installed outside the Plant building. If installed indoors, proper ventilation and exhaust shall be provided in the room;
c) DG set should be properly earthed;
d) Before refuelling the set, it shall be turned off and allowed to be cooled;
e) 'No smoking' directive within the vicinity shall be strictly enforced;
f) Any possibility of back-feeding from grid power or the system shall be prevented;
g) Fuel shall be stored outside DG room /area and also away from any appliances that may ignite it;
h) Lightning protection of buildings;
j) Routing of down conductors (insulated or un-insulated) of lightning protection through electrical or other service shafts are not allowed as it can create fire and explosion during lightning. For details, see Part 8 'Building Services, Section 2 Electrical and Allied Installations' of the NBC Vol I; and
k) Escape lighting and exit signal.

All exits shall be properly identified, with adequate lighting so that all occupants shall be able to leave the facility safely. Emergency lighting shall be powered from a source independent of that supplying the normal lighting. The emergency lighting shall be provided to be put on within 5s of the failure of the normal lighting supply. Also, emergency lighting shall be able to maintain the required illumination level for a period of not less than 90 min in the event of failure of the normal lighting.

9 FIRE FIGHTING SYSTEMS

a) Carbon dioxide (CO_2), dry chemical and foam-based portable fire extinguisher;
b) Emergency alarm and mass notification systems;
c) Enforcement of 'NO SMOKING' directive in and around the installation; and
d) Provision of sand bucket.

10 FIRE SAFETY PLAN

The fire safety plan (as under) shall be distributed to all working in the ropeway establishments.

10.1 Fire Safety Plan Format

a) Ropeway installation Address;
b) Street and pin code number;
c) Telephone number of local police and fire authorities; and
d) Purpose and objective.

10.2 Purpose

To establish method of systematic, safe and orderly evacuation in ropeway installation in case of fire or other emergency, in the least possible time, to a safe area by the nearest safe means of egress, also the use of such available fire appliances (including sounding of alarms) as may have been provided for controlling or extinguishing fire and safeguarding of human life.

10.3 Objective

To provide proper education to the personnel working in the ropeway system to ensure prompt reporting of fire, the response of fire alarms as designated, and the immediate initiation of fire safety procedures to safeguard human life as well as the installation.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Composition of the Panel-1 on 'Aerial Ropeways' MED 06

Organizations	*Representative(s)*
In Personal Capacity	SHRI A. BHADRA (***Convener***)
In Personal Capacity	SHRI C. K. KARMAKAR
In Personal Capacity, Kolkata	SHRI DWIJENDRA LAL DAS (*Invitee*)
CSIR-CIMFR, Dhanbad	DR DEBASISH BASAK
CRS, Pvt Ltd, Kolkata	SHRI K. BOSE
Damodar Ropeways & Infra Ltd, Kolkata	SHRI RANJAN MUKHERJEE
Usha Breco Limited, Ghaziabad	SHRI MANOJ PANWAR

Member Secretary

SHRI A. K. MOHINDROO
SCIENTIST 'C' (MED), BIS

Bureau of Indian Standards

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